

COMPARISON OF SEISMIC RISK OF LOW RISE IMPORTANT BUILDINGS DESIGNED BY DIFFERENT EDITIONS OF IRANIAN SEISMIC CODE

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ABSTRACT

Buildings with high degree of importance and facilities such as hospitals, police stations, fire stations and other vital facilities play crucial role in crisis and risk management of cities. Therefore special attention has been paid to design and construct these buildings in order to maintain their performance during and after the earthquake. Design of important building in Iran is conducted based on the Iranian code of practice for seismic resistant design of buildings (ISC). Since the first launch of ISC, three editions of ISC have been introduced. In this study, improvement of seismic safety of important buildings in different editions of ISC are examined and the results are compared that with acceptable level of safety. In this study, a very important 3-story steel moment resisting frame is selected and designed based on different editions of ISC for high seismic zone. The seismic fragility functions of buildings are estimated in all four soil classifications. The probability of failure of frames are estimated for Tehran and Tabriz where are two major cities located in high seismic zones. Results show a good improvement in safety of different frames in recent editions of ISC, especially from first to second edition. However, the functionality and safety of buildings were not satisfy the minimum requirement of the code. In addition the probability of failure of frames located in softer soil types is higher than others. This indicated that within any code edition, a constant limit of safety was not provided in different soil types.

INTRODUCTION

Iranian seismic code (ISC) or standard number 2800, which first introduced just before Manjil-Rudbar earthquake in 1988, has been used for designing of buildings and other facilities. So far, three editions of code are introduced and the fourth edition released recently. The introduction of the code improve the quality of construction and reduce the vulnerability of structures. But experience of recent earthquake such as Varzaghan earthquake, demonstrate that some structures, especially important buildings such as hospitals are vulnerable to earthquake.

Although many improvement in design requirement of important buildings have been introduced in the recent versions of ISC, some studies have shown that the important buildings (or very important building which indicated in the code) designed based on the latest version of ISC are not satisfied the ISC's criteria. Mahmoodi (2009) studied the effect of regularity in very important building designed based on ISC. Also, Mahmoudi and Ghobadi (2011) are studied the performance of important building which do not remain operationally after serve earthquake. The uncertainties in the application of R factor in static design and vulnerability seismic evaluation of important building consequently are studied by Behnamfar and Nafarieh